**Precalculus Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Notes 2.2**

1. **Given the equation, describe the parabola.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Equation** | **Vertex** | **Axis of Symmetry** | **Direction of Opening** | **Width** |
| 1. y = (x – 3)2 |  |  |  |  |
| 2. y = (x + 8)2 |  |  |  |  |
| 3. y + 2 = x2 |  |  |  |  |
| 4. y = -3(x + 7)2 – 2 |  |  |  |  |
| 5. y – 5 = .9(x – 5)2 + 1 |  |  |  |  |

1. **Given a description, write the quadratic equation.**
2. Write the equation of the parabola where h = 3, k = -2, and a = 3.
3. Write the equation of a parabola that opens downward, is narrow, and has a vertex at (3, -2).
4. Write the equation of the parabola that opens upward, is wide, & has a vertex at (-3, 5).
5. Write the equation of the parabola that has a vertex at and goes through the point .
6. Write the equation of the parabola that is identical to y = -4(x + 1)2 – 3, except the parabola has been shifted 3 units to the right, 2 units up, and now opens in the opposite direction.
7. **Find the x and y intercepts for each quadratic function.**

**For quadratic functions, there may be \_\_\_\_, \_\_\_\_, or \_\_\_\_\_ x-intercept(s).**

**There will always be \_\_\_\_ y-intercept.**

**Remember…**

Find the x and y intercepts of y = 4x + 2. (Hint: These are ordered pairs!)

x-intercept: y-intercept:

Find the x- and y-intercept(s) for each quadratic function.

1. y + 4 = (x – 3)2
2. y + 5 = (x + 2)2
3. y = (x – 6)2 – 3
4. **Leading Coefficient Test:** As x moves to the left or right, the graph of the polynomial function eventually rises or falls in the following manner.
5. **When n is ODD:**

If the leading coefficient is positive (a> 0), the graph falls to the \_\_\_\_\_\_\_\_\_ and rises to the \_\_\_\_\_\_\_\_\_\_.

If the leading coefficient is negative (a < 0), the graph falls to the \_\_\_\_\_\_\_\_ and rises to the \_\_\_\_\_\_\_\_.

1. **When n is EVEN:**

If the leading coefficient is positive (a > 0), the graph \_\_\_\_\_\_\_\_\_\_. to the \_\_\_\_\_\_\_\_\_\_. **and** \_\_\_\_\_\_\_\_\_\_.

If the leading coefficient is negative (a < 0), the graph \_\_\_\_\_\_\_\_\_\_. to the \_\_\_\_\_\_\_\_\_\_. **and** \_\_\_\_\_\_\_\_\_\_.

**Ex 1:** Describe the end behavior of the graph of *f(x)* = -x3 + 4x.

Degree of polynomial: even/ odd

Leading Coefficient is: positive/ negative

Graph:

**Ex. 2:** Describe the left-handed and right-handed behavior of the graph of each function.

* 1. *f(x)* = x4 – 5x2 + 4
  2. *f(x)* = x5 – x

**Solve by Factoring.**

1. (x – 6)(x + 2) = 0 2. (2x + 6) (x – 3) = 0

3. x2 + 13x + 40 = 0 4. m2 – 3m – 28 = 0

**Repeated Zeros:** A factor (x – a)k, k > 1, yields a **repeated zero** x = a of **multiplicity** k.

1. If k is odd, the graph **\_\_\_\_\_\_\_\_\_\_\_** the x-axis at x = a.
2. If k is even, the graph **\_\_\_\_\_\_\_\_\_\_\_** the x-axis (but does NOT cross the x-axis) at x = a.

**Ex:** *f(x)* = -2x4 + 2x2

Factor completely.

Describe the multiplicity of each factor and whether it crosses or touches the x-axis.

a)

b)

c)